Foreign Animal Disease Report

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In this Issue

Recent Events

Avian Influenza

In the early spring of 1983 an outbreak of avian influenza occurred in southeastern Pennsylvania. This area has a high density of commercial egg and meat bird production premises as well as numerous breeder flocks and hatcheries. The original incursion of the disease was rather mild, with a transient drop in egg production in laying flocks, drop in feed and water consumption, mild to moderate respiratory distress, high morbidity, but low mortality.

The causative agent was identified as Type A influenza virus serotype H_5N_2. This is antigenically differentiated from the virus that is considered the cause of classical fowl plague, a foreign disease that has not been found in the United States since 1929. The fowl plague virus is serotyped H_7N_7.

The outbreak of low pathogenicity avian influenza spread slowly but insidiously through the major poultry area in Lancaster County, Pa., with sporadic outbreaks in the surrounding area. But, in October, there was a dramatic increase in the pathogenicity of the virus, as observed in both the field and laboratory, from mild to severe. In the field, morbidity and mortality rates increased, with mortality in many cases exceeding 40 percent of the flock. The necropsy lesions were most notable in the respiratory and alimentary organs and were characterized by edema and hemorrhage.

A Federal quarantine was placed on the area Nov. 4, 1983. An extraordinary emergency was declared on Nov. 9, 1983, with Federal funds made available on that same date. A Regional Emergency Animal Disease Eradication Organization (READEO) Task Force was officially activated on November 9 and the first flock was depopulated 3 days later.

At the end of the calendar year, the Task Force had expanded in size to include 276 Federal employees, 54 State employees, 44 military personnel, and 7 wildlife biologists, plus industry personnel, for a total of 399. In addition, there were 15 employees at National Veterinary Services Laboratories at Ames,

Iowa and 22 at Hyattsville, Md., involved primarily in the eradication effort.

The original quarantine area of 2,400 square miles in Pa. was expanded to 5,100 square miles. An additional 400-square-mile area was quarantined Nov. 23, 1983, in New Jersey in response to the discovery of an infected flock in that State. Six weeks after elimination of the infected chickens, and following a thorough surveillance of the flocks in the area, no additional infected flocks had been found and the New Jersey quarantine area was reduced to a 12-square-mile buffer zone around the originally affected premises. On Jan. 27, 1984, Federal quarantines were place on 3,200 square miles in Va. in the Shenandoah Valley area and on 300 square miles in northeastern Md.

By the time this issue of FAD Report was finalized, 298 premises had been declared positive for lethal avian influenza in Pa. and were depopulated. The indemnity cost for the 11,411,802 birds in the depopulated flocks was $21,752,870. The average size of the flocks was 38,294 birds, with an average indemnity cost of $1.91 per bird. In addition, there were indemnity costs for feed, eggs, and other contaminated items totaling $1,919,576, which amounts to over $6,441 per premises. Task force support costs totaled $8.3 million.

The disease has been confined to commercial bird production enterprises, with the largest losses in layer and broiler flocks. There have also been losses in guinea fowl, turkeys, and quail. Depopulations have included ducks and geese that were on infected premises.

Avian influenza does not affect humans. Only poultry have been affected during the current outbreak, even though other species have been extensively exposed.

A satisfactory vaccine for avian influenza is not available. Futhermore, the use of vaccine during an eradication campaign would make diagnosis more difficult by producing avian influenza antibodies in normal birds and suppressing the signs of disease that otherwise would be observable in infected birds.

The cooperative Federal-State-industry program objective is to eradicate lethal avian influenza from the United States. The first task in reaching this objective is containment, identification, and eradication of the disease within the established quarantine area. The final task will be to determine through active surveillance that the last residue of infection is eliminated.
(Dr. Allan A. Furr, 301 436-8092)

BAI Centennial

On May 29, 1984, the United States Department of Agriculture (USDA) will have a commemorative ceremony in the patio of the Agriculture Administration Building recognizing the 100th anniversary of the Bureau of Animal Industry (BAI) and "100 years of animal health." The first work of the Bureau was to eradicate contagious bovine pleuropneumonia, which for a number of years had caused serious losses in cattle herds of Eastern States. The disease was eliminated in 1892--just 8 years after the creation of the BAI. Since then, the USDA, in cooperation with State governments and the livestock industry, has eliminated 11 more diseases and parasites from this country, thereby saving many millions of dollars in potential losses to producers and helping to keep food supplies plentiful and reasonably priced. (Dr. Henry Harper, 301 436-5928)

World Animal Disease Roundup

The year 1983 faded away with a reminder that **foot-and-mouth disease** (FMD) can provide unpleasant surprises any time. On Dec. 30, 1983, a case of type O FMD was reported from the Netherlands. This was after the situation in Central Europe had been fairly stable for most of the year. Investigations as to the origin of the case are in progress, but there are suspicions that it came from the Dutch Central Virus Institute. Elsewhere in the world, the disease was reported from Kenya, Tanzania, South Africa, Nigeria, Libya, and Morocco. In Asia, FMD was reported from Iran, Thailand, and Hong Kong. From the Americas, the largest number of cases was seen in Argentina and Brazil. Smaller numbers were reported from Peru, Ecuador, Bolivia, Paraguay, and Venezuela. In Europe, Turkey had the most cases, followed by Portugal and Spain.

Rinderpest is still causing problems in Africa. Hardest hit is Nigeria, where unconfirmed trade sources place cattle losses at 1.5 million head. Elsewhere, the disease was reported from Mali and the Ivory Coast. There are reasons to believe that it exists in other African locations without being reported. In the Near East, another case was reported from Israel, even though this country appears to have a solid vaccination program. Saudi Arabia has problems with this disease due to importations from countries where rinderpest is endemic.

In recent history **Contagious-bovine-pleuropneumonia** has been considered primarily an African disease. Recently it has been reported from Namibia, Angola, and Nigeria. However, the largest number of cases is now being reported from Portugal (100 in April, 217 in May, 245 in June 1983). The disease may also be present in Spain, although there has been no official confirmation of this suspicion. A flareup of the disease in southern France in 1982 seems under control.

It appears that the Western Hemisphere may again be free of **African swine fever** (ASF). In Haiti, all native swine have been destroyed. The last round of tests on sentinel pigs in Haiti was completed in December 1983 without finding any evidence of ASF. Brazil declared its southern region, representing 42 percent of its pig population, free from ASF. No cases have been reported elsewhere in that country since November 1981. In

Europe the disease is still seen in Portugal, Spain, and the Italian island of Sardinia. However, no further outbreaks are reported from the Italian mainland. In Africa, the disease was reported from Zambia and Angola, but there is reason to believe that it may also exist in other countries there. (Dr. H. J. Seyffert, 301 436-8285)

Cattle Importation

European cattle arrived aboard specially equipped aircraft at Boca Chica Naval Air Station, near Key West, Fla., on December 19 and 26, 1983, and were immediately transferred to the U.S. Department of Agriculture's Harry S Truman Animal Import Center (HSTAIC) on Fleming Key. All 228 animals had been tested before shipment while being kept in high security quarantine facilities in France. Breeds and countries of origin are: Limousin, Salers, Maine Anjou, and Pie Rouge, from France; Simmental, Brunvieh, and Eringer, from Switzerland; Gelbvieh from the Federal Republic of Germany; and Simmental from Austria. They will be eligible for release from quarantine on March 26, 1984, provided they remain healthy and free of foot-and-mouth disease, bluetongue, tuberculosis, brucellosis, and contagious bovine pleuropneumonia. Importations through HSTAIC are making it possible for U.S. livestock producers to import cattle from several foreign locations. This is new genetic material that was formerly prohibited due to the presence of foot-and-mouth disease and other foreign diseases in the countries of origin. (Drs. Melvin R. Crane and Mark P. Dulin, 301 436-8170)

Penguin Eggs Imported

The USDA recently cooperated with Hubb's Seaworld Institute to safely import 450 fertile penguin eggs from Antarctica. On Dec. 13, 1983, eggs of nine bird species--mostly penguin--arrived in San Diego, Calif., aboard a Chilean Air Force 707 cargo jet from Antarctica, to be hatched in quarantine under USDA supervision at Seaworld Institute there. The shipment is part of a special research project to preserve penguins and other species and exhibit the birds to the public. Hubb's Seaworld plans to establish and maintain a self-perpetuating colony of high Antarctic penguins that will be available for research purposes, year-round.

The imported penguin eggs were collected on Nelson Island by four Seaworld researchers, accompanied by two German cameramen. This island is about 70 miles from the ice cap, where severe weather conditions created dangerous conditions for helicopter operations. Eggs were placed in portable incubators and transported within 40 hours to San Diego. The hatch and brood will be tested and observed for viscerotropic velogenic Newcastle disease (VVND), avian influenza, and other poultry diseases.

Antarctica is known to harbor VVND virus. Hatching eggs present low risk of VVND transmission and are the most economical means available for the importation of disease-free birds.

Some of the eggs were hatching on arrival. Chicks are being hand-fed a special formula around the clock. Although several of the baby birds did not survive and some have shown spinal

abnormalities, many have already advanced to a solid food diet. Twenty people will be required to feed and care for the birds before the 90-day quarantine is completed.

Small shrimp-like crustaceans called krill are a primary food source for penguins. Research will be carried out on the survival of penguins should their normal food sources change due to factors such as commercial harvesting of krill. (Dr. Samuel S. Richeson, 301 436-8172)

Vesicular Stomatitis in Mexico

Surveillance activities of the Mexican-American Commission for prevention of Foot-and-Mouth Disease (CPA) during 1983 on a total of 235 reports of vesicular conditions in Mexico led to the diagnosis of New Jersey type vesicular stomatitis (NJVS) on 119 premises. Mexico has been free of foot-and-mouth disease since 1954. Indiana type vesicular stomatitis was identified on one premise. All but two (1 equine, 1 porcine) of these occurrences were in cattle. Vesicular lesions were found in 1,023 cattle positive for NJVS, with a total of 8,725 cattle present, for an attack rate of 11.7 percent. This year's outbreak was considered to be somewhat larger and more widespread than in recent years. The distribution of affected herds was very spotty, with no heavy concentrations in any area. The peak of occurrences was reached in September and October, and the incidence has since dropped off. (Adapted from CPA Quarterly Report Oct. 1-Dec. 31, 1983)

Special Report...

Parafilariasis Treatment

The efficacy of Ivermectin®* against parafilariasis, caused by Parafilaria bovicola, has been evaluated in cattle with natural infections of the parasite. Ivermectin is a broad spectrum injectable antiparasitic agent capable of controlling a wide range of external and internal parasites. Infection was diagnosed by identifying parafilaria species eggs or microfilariae in cutaneous haemorrhages. Drug efficacy was determined by a reduction in the number and size of subcutaneous lesions at slaughter.

Dose rates of 100, 200, and 400 mg/kg body weight were found to be 100 percent effective in reducing the number and surface area of eosinophil positive lesions. A 100-percent reduction of focal cutaneous hemorrhages at doses of 200 and 400 mg/kg and a 76-percent reduction at a dose of 100 mg/kg were found 42 days after treatment.

Preliminary results indicate that Ivermectin is highly effective against adult P. bovicola. (Dr. Chester A. Gipson, 301 436-8321)

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* Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U. S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

Focus on...
Contagious Bovine Pleuropneumonia

If the Bureau of Animal Industry (BAI), formed just 100 years ago in 1884, was so successful in its initial objective to "extirpate" contagious bovine pleuropneumonia (CBP) from the United States, why do we raise the subject now? It is because CBP is behaving menacingly in several foreign countries, and may be an increasing hazard to cattle populations currently not considered at risk. In June 1983, the Commission of the European Communities (CEC) held a meeting in Brussels to discuss "Procedures for the Diagnosis of Contagious Bovine Pleuropneumonia." The objectives were to review the current and possible future techniques for diagnosis, encourage standardization of methods among member states, and draw attention to the problems and needs for research.

Contagious bovine pleuropneumonia has always been an insidious disease, with a protracted incubation period and lack of obvious signs. With the current rather liberal use of antibiotics, signs of the disease are further subdued, making clinical identification even more difficult.

CBP Organism

The organism producing CBP was first identified by two of Pasteur's students, Nocard and Roux, in 1898. It is interesting to note this was 6 years after the BAI had eradicated CBP from the United States. The organism is currently known as Mycoplasma mycoides, subspecies mycoides. Mycoplasma differ from other organisms in that they are devoid of a rigid cell wall and are bounded only by a plasma membrane. They are striking in their appearance under dark field microcospy as small coccoid or coccobacillary cells, occuring either singly or as filamentous, frequently branching chains.

M. mycoides grows readily on media that are conveniently available. It forms a characteristic colony that is described as a "fried egg" from the appearance of a dark center surrounded by a light peripheral zone.

Hosts

The host range of M. mycoides subsp. mycoides is limited to cattle and water buffalo. These frequently exhibit the signs of contagious pleuropneumonia. A mycoplasma that is morphologically and serologically similar is occasionally recovered from arthritic or pleuritic goats. Thus far, these goat isolates produce large colonies (LC, 2.25 mm), whereas isolates from cattle affected with CBP produce small colonies (0.99 mm). From the limited work carried out, the goat M. mycoides subsp. mycoides (LC) does not appear to produce contagious pleuropneumonia in goats nor is it naturally pathogenic for cattle or buffalo. Further studies are needed to correlate the characteristics of M. mycoides with pathogenicity for hosts that are of agricultural significance.

Transmission

Transmission of CBP is usually by the exhaled breath of an infected animal to a susceptible bovine. Transmission of CBP by respiratory exudate has frequently been recorded up to 20 meters, and in at least one instance, to a distance of 200 meters separating the infected cattle from the susceptible

ones. Both groups of cattle were in outdoor pens. Contaminated facilities and meat products have not been shown capable of transmitting this disease.

The role of sequestra in CBP transmission is discussed below (see Carriers and Diagnosis).

Pathogenesis

Incubation periods may vary from 5 to 200 days after a susceptible bovine inhales M. mycoides subsp. mycoides. Acutely affected animals show anorexia, loss of rumen motility, decreased milk production, and fever that seldom exceeds 40°C. They develop signs associated with fibrinous pleurisy, such as reluctance to move, shallow breathing, and slight, intermittent cough. Affected animals get progressively weaker and die.

Pathology

Lesions observed at necropsy are limited to the thoracic area. In acute cases several liters of fluid may be present in the pleural cavity. Thick caseous fibrin deposits are often found over the visceral and parietal pleura. Interlobular septa of the lungs are distended by edema, and the pulmonary lobules become hepatized and range in color from deep red to grey. Animals frequently appear to recover. During this period of apparent improvement, a part of the affected lung may become necrotic and encapsulated by fibrous tissue, forming a sequestrum--another characteristic of CBP.

Carriers and Diagnosis

Sequestra are important in the epizootiology of CBP. Viable organisms may persist in a sequestrum for over a year, during which time the animal's antibody level may fluctuate and occasionally be undetectable. The sequestrum may rupture, shedding viable M. mycoides into the bronchi, or initiating new active lesions--both events providing means for disease transmission.

M. mycoides has been known to persist in the bovine nose for at least 6 weeks before any serological or clinical reaction was observed. During an incubation period that may exceed 3 months, cattle fail to develop complement fixing antibodies. Of the tests used during large-scale control programs, various adaptations of complement fixation (CF) are preferred because of their higher ability to detect carrier animals, and negligible rate of false positive reactions. Also, the CF test is most likely to identify carriers that have developed sequestra. With a procedure developed in East Africa, a team of four experienced individuals can bleed and CF test up to 1,500 animals a day. A standardized dilution of 1:10 is used in screening the serums.

In investigating a suspected occurrence of CBP, the clinical picture is not very revealing or helpful unless several animals are showing the suggestive signs described earlier--signs resulting from lung damage and pleuritis, such as slight cough, reluctance to move, and painful, shallow breathing. At this stage, M. mycoides may be recovered from the blood.

At necropsy, lesions present in the thoracic area are quite characteristic. However, laboratory confirmation of CBP is necessary in most instances. M. mycoides is usually prevalent in the pleural fluid and affected portions of the lung. Once

the organism is cultured in the laboratory, it can be subjected to a variety of tests: tube or plate precipitin, complement fixation, growth inhibition, and immunofluorescence. If viable organisms cannot be cultured from a specimen containing M. mycoides, they may be demonstrated by precipitation with specific antiserum. The precipitate may be produced even though the tissue specimen has been fixed in formalin for long periods.

Epidemiology

One of the major hazards associated with CBP is its ability to move subtly through a cattle population, infecting many animals before its presence is suspected. It is a disease associated with animal movement. The gathering of epizootiological information must take into consideration the protracted period of incubation in identifying animals at risk. This has been observed in recent transmission of the disease in southwestern Europe, where cattle are grazed in communal pastures in the summer in the Pyrenees Mountains. No clinical evidence of CBP was noted, but when the cattle were returned to their respective owners and closely confined for the winter, major outbreaks occurred. (Dr. William M. Moulton, P.O. Box 36, East Dover, Vt. 05341; 802 348-7996)

How FAD Report is prepared for Publication

The Foreign Animal Disease (FAD) Report is primarily the product of the authors whose names appear at the end of each article. Each issue is planned at least 3 months in advance of the printing date. Articles receive a series of editorial reviews, and any significant change is referred to the author for approval.

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